

II. Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in this application.

1. (Previously Presented) A pumping system comprising, in combination:

a source of fluid for selective pressurization;

a hydraulic mechanism structurally configured to apply high pressure to said fluid, the hydraulic mechanism comprising a trigger pivotally mounted within a housing, the housing including valves mounted therein that control the movement of fluid and also including a manually operable actuator at a distal end of the housing allowing manual pressure release by one hand of a user while holding the housing in the same one hand, the manually operable actuator selectively releasing pressure on said fluid within a conduit by releasing at least a portion of said fluid out of the conduit and external to the fluid source;

the conduit selectively carrying said fluid from said source when said fluid is pressurized, the conduit extending from a proximal end of the housing that is substantially opposite of the distal end of the housing; and

a container of a viscous material connected to said conduit to receive pressurized fluid from said conduit to selectively force said viscous material from said container,

wherein the valves include first and second automatic pressure valves such that a pressure chamber for said liquid is formed between said first and second automatic pressure valves, the first automatic pressure valve operable to allow said fluid to leave said pressure chamber and flow to said container when said pressurized fluid exceeds a first predetermined pressure threshold magnitude, the second automatic pressure valve operable to return pressurized fluid to said source when said pressurized fluid exceeds a second predetermined pressure threshold magnitude, wherein said second predetermined threshold is greater than said first predetermined threshold.

2. (Original) The system recited in claim 1, wherein the conduit is a flexible tube.

3. (Currently Amended) The system recited in claim 1, wherein said source of fluid comprises a reservoir for storing [[g]] said fluid.

4. (Original) The system recited in claim 1, wherein said fluid is an incompressible liquid.

5. (Withdrawn) The system recited in claim 1 wherein, said container comprises a syringe.

6-8. (Canceled)

9. (Previously Presented) The system recited in claim 1 including, connector means for connecting said conduit to said container wherein the connector means rotates about said conduit to permit selective bleeding of air from said container.

10. (Withdrawn) The system recited in claim 9 wherein, said connector means rotates about said conduit to permit selective bleeding of air from said container.

11. (Withdrawn) The system recited in claim 5 wherein, said syringe includes a plunger movable therein.

12-14. (Canceled)

15. (Withdrawn) The system recited in claim 10 wherein, said connector includes, a hollow housing for receiving an end of said conduit through an axial opening therein, a set screw threadedly engaged with the interior of and hollow housing and surrounding said end of said conduit,

seal means surrounding said end of said conduit, said set screw adapted to force said ferrule means and said seal means into contact with the interior of said hollow housing to provide a seal around said conduit in said hollow housing.

16. (Previously Presented) The system of claim 1, where the system operates at moderate to high pressures ranging from at least about 1,000 psi to 2,000 psi.

17. (Previously Presented) The system of claim 1 wherein, said conduit is long enough to permit a user/surgeon to be outside of a radiation field of a patient being imaged.

18. (Previously Presented) The pumping system of claim 17, further comprising valves within the housing for controlling the movement of said fluid from said source of fluid through said conduit whereby and, a connector which is capable of rotating around the conduit and bleeding off of any air present when the system is operating, both manually and automatically.

19. (Previously Presented) An improved system for operating a hydraulic pressure pump for medical usage, comprising:

a hand-piece with a housing having a lever operated hydraulic pump, a fluid reservoir, a manually operable actuator to selectively release pressure in the system, and valves mounted therein that control the movement of said fluid;

a connecting tube extending from a proximal end of the housing, wherein the manually operable actuator positioned at a distal end of the housing selectively releases pressure on said fluid within the connecting tube by releasing at least a portion of said fluid out of the connecting tube and external to the fluid reservoir;

a remote connector at an end of the connecting tube which seals to a syringe body;

whereby the pump expels fluid from the fluid reservoir, through the connecting tube into the top of the syringe and where fluid presses on a syringe plunger, thereby expelling the material contained in a primary chamber of the syringe therefrom; and

a low viscosity, secondary incompressible fluid is used in the connecting tube lowering the force required to expel material from the syringe, and reducing the volume of injected fluid needed,

wherein the valves include first and second automatic pressure valves such that a pressure chamber for said liquid is formed between said first and second automatic pressure valves, the

first automatic pressure valve operable to allow said fluid to leave said pressure chamber and flow to said connecting tube when said pressurized fluid exceeds a first predetermined pressure threshold magnitude, the second automatic pressure valve operable to return pressurized fluid to said source when said pressurized fluid exceeds a second predetermined pressure threshold magnitude, wherein said second predetermined threshold is greater than said first predetermined threshold.

20. (Previously Presented) The improved system for operating a hydraulic pressure pump for medical usage of claim 19, wherein pressures ranging from at least about 1,000 psi to 5,000 psi allow a user to perform procedures in the spine of a patient.

21. (Previously Presented) A hand-held pumping system comprising:

a source of fluid for selective pressurization;

a housing means for containing the source of fluid;

a mechanism for applying pressure to said fluid;

a flexible conduit for selectively carrying said fluid from said source when said fluid is pressurized, said flexible conduit having an inlet end operative to receive the fluid, and an outlet end for discharging the received fluid, said flexible conduit extending from a proximal end of said housing means that is substantially opposite of a distal end of said housing means;

a container of a viscous material connected to said outlet end of said conduit said conduit to receive pressurized fluid from said conduit to selectively force said viscous material from said container;

a pressure release mechanism connected to said distal end of said housing means for selectively relieving pressure from said fluid in said conduit by releasing at least a portion of said fluid out of the conduit and external to the fluid source; and

first and second automatic pressure valves connected to said housing such that a pressure chamber for said liquid is formed between said first and second automatic pressure valves, the first automatic pressure valve operable to allow said fluid to leave said pressure chamber and flow through said inlet of flexible conduit when said pressurized fluid exceeds a first predetermined pressure threshold magnitude, the second automatic pressure valve operable to

return pressurized fluid to said source when said pressurized fluid exceeds a second predetermined pressure threshold magnitude, wherein said second predetermined threshold is greater than said first predetermined threshold.

22. (Previously Presented) The system recited in claim 21 including handle means for supporting said source of fluid.

23. (Previously Presented) The system recited in claim 22 wherein said mechanism for applying pressure to said fluid comprises, trigger means mounted to said handle means for selectively applying pressure to said fluid in said source of fluid.

24. (Previously Presented) The system recited in claim 23 including:
housing means formed with said handle means; and
wherein the first and second automatic pressure valves are mounted in said housing means for controlling the movement of said fluid from said source of fluid through said conduit.

25. (Previously Presented) The system recited in claim 21 including a connector means for connecting said conduit to said container, said connector means rotates about said conduit to permit selective bleeding of air from said container.

26. (Previously Presented) The system recited in claim 21 including:
wherein the first and second automatic pressure valves are mounted in said housing means for controlling the movement of said fluid from said source of fluid through said conduit;
and
connector means for connecting said conduit to said container.

27. (Previously Presented) The system recited in claim 25, wherein said connector means includes:
a hollow housing for receiving an end of said conduit through an axial opening therein;

a set screw threadedly engaged with the interior of said hollow housing and surrounding said end of said conduit;

seal means surrounding said end of said conduit; and

ferrule means surrounding said end of said conduit,

said set screw adapted to force said ferrule means and said seal means into contact with the interior of said hollow housing to provide a seal around said conduit in said hollow housing.

28. (Previously Presented) The system recited in claim 21, wherein the pressure release mechanism comprises a valve, and wherein the pressure release mechanism is pivotally rotatable about a pin connection to release the valve.

29. (Previously Presented) The system recited in claim 21, comprising a relief valve between the source of fluid and the pressure chamber for automatically releasing fluid to the pressure chamber when the pressure exceeds a third predetermined pressure threshold magnitude within the source of fluid, wherein the pressure release mechanism is disposed to release pressure from the conduit and wherein the relief valve is disposed to release pressure from the fluid source pressurizable by the trigger means.